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FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 71. No. 1417. OCTOBER 14, 1943

Registered at the G.P.O. as a Newspaper. Offices: 49, Wellington Street, Strand, London, W.C.2

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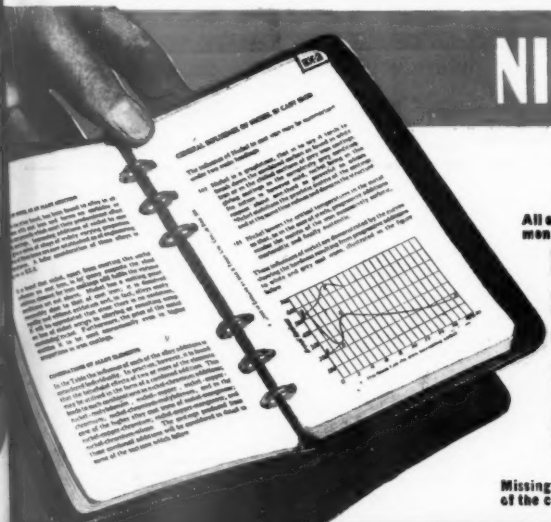

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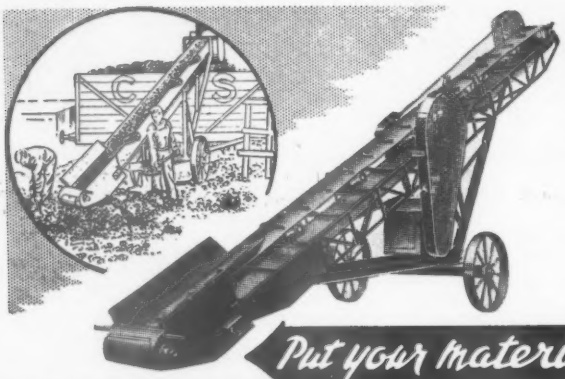

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FOUNDRY TRADE JOURNAL
Established 1902
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Vol. 71 Thursday, October 14, 1943 No. 1417

Lessons from Wartime Developments

The description which we are now publishing of steel bomb making marks the beginning of a new era in steelfoundry practice. Under the stress of wartime conditions the following problems have been solved:—(1) The need for hematite pig-iron has been eliminated; (2) the consumption of ferro-silicon has been kept to a minimum; (3) the synchronisation of a triplex melting process has been successfully achieved; (4) the pouring of liquid steel into moulds by the continuous system has been established; (5) the heat radiated from the cooling castings has been conserved and utilised; (6) large tonnages of sand are being effectively cooled; (7) a very high percentage of female labour is employed; and (8) a creditably clean atmosphere, associated with a controlled shop temperature, has ensured the best possible working conditions.

The simple, yet novel, metallurgical theory underlying the steelmaking process ranks in importance to our mind with Mushett's contribution to the success of the original Bessemer process. It is to be detailed in the near future by its inventor in a Paper to be presented before one of the national technical institutes. There is every indication that the development brings about very considerable economies in the cost of steelmaking. The successful exploitation of this plant has shown to be untenable the old argument posed by the old-fashioned steelmaker that triplex processes are uneconomical because a breakdown in one section renders three sets of men idle. Intelligent construction, layout and operation have rendered this factor a negligible risk—a risk now magnified enormously as not merely the steelmaking, but the whole of a complex manufacturing process is interlocked with it.

Perhaps the greatest repercussion following upon the publication of this article will be the attention which is bound to be given in the post-war era to the utilisation of the heat radiated from cooling castings. The steel ingot industry gave the lead years ago by the installation of soaking pits. In quantity production foundries, this radiated heat has either been allowed to befoul the foundry atmosphere or has been wasted by hanging the castings on power-driven cooling conveyors to take them for a half-mile circuit or more around the foundry yard. Sand cooling using the rotating cascading system commonly employed for drying core sand has every appearance of solving a problem in a more compact plant than has hitherto, to the best of our knowledge, been installed. The plant described shows, in common with many other modern installations, how by breaking down each operation into its irreducible minimum, associated with excellent handling facilities, female labour can be introduced to the maximum extent. In this connection it is interesting to recall that only about 20 years ago the foundry industry was astonished to hear the recommendation made by one of the world's leading industrialists that each moulder should have available at least six horse power. As in this foundry there are but a handful of moulders, this estimate now becomes ridiculous. Of great moment is the care and the great expenditure which has been made in heating, cooling and ventilating this modern foundry, because most factory legislation arises from the accomplishments of the more enlightened firms and not, surprisingly enough, on the representations made by the trade unions. The publication of this article is particularly significant as it can be regarded as an example of what British industry has accomplished in one field of armament production. When the curtain is raised and reveals the whole scene of our war-time efforts, the foundry will be shown to have taken a leading part in ensuring ultimate victory.

Contents

Lessons from Wartime Developments, 117.—Notes from the Branches, 118.—Canadian Iron and Steel Output, 118.—American Steel Expansion, 118.—The Foundry Industry and Air Warfare—IV, 119.—The Institute of Vitreous Enamellers, 125.—Metal or Wooden Patterns and Coreboxes, 127.—Melting Furnaces for Aluminium Alloys, 128.—The Scrap Barometer, 130.—New American X-Ray Unit for Inspecting Aircraft Castings, 130.—News in Brief, 132.—Personal, 132.—Company Results, 134.—Iron and Steel Institute, 134.—Obituary, 134.—Raw Material Markets, 136.—Contract Open, 136.—Derbyshire Fluorspar Producers, 136.

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NOTES FROM THE BRANCHES

Middlesbrough.—The opening meeting of the new session which was at the Café Royal, Middlesbrough, was nominally a visit from the President of the Institute, Mr. D. Sharpe. Mr. G. O. Stanley presided, and delivered his presidential address. He took as his subject, "What is Science," and after a short philosophical treatment related its direct impact on the foundry industry. He instanced such cases as the discovery of X-rays and the spectroscope. Dealing with the affairs of the Branch, he pointed out that during the last five years the membership had increased by 43 per cent. This he ascribed to the energetic work of Mr. J. K. Smithson, the honorary secretary, and to the personal interest of Mr. Swift, the retiring president, who has done much pioneering in the Darlington area. Mr. Short devoted his remarks to an appeal for members to take an increased interest in educational matters, especially in creating an immediate supply of reliable practical teachers. The two addresses were well received, and the thanks of the meeting were voiced by Mr. Swift and Mr. H. Foster. At the conclusion of the meeting, members and the ladies were entertained to tea at the invitation of the Branch Council.

South Africa.—At the annual meeting, preceded by a dinner, Mr. J. M. Stones was elected president, Mr. P. L. Ward vice-president, Mr. Skok honorary secretary. The following members were elected to fill vacancies on the Council:—Colonel Grose, Mr. Teubes, Dr. Matthews and Mr. Alexander. In his valedictory address, the retiring president, Mr. D. L. M. Cachet, expressed the opinion that no other Institute in South Africa could muster such a large gathering. A well balanced programme of lectures and a round of interesting works' visits had resulted in a record membership. He asked for the co-operation of the Government in making the transition of war to peace time production a properly organised process so as to avoid industrial chaos. The latter condition creates that psychological state of mind which is a prerequisite for trade depression. Mr. Nimmo Dewar and Mr. Tonge expressed the thanks of the members to the retiring president for his address. After the business meeting, Colonel Guy, a past branch president, recalled some of the difficulties he and his colleagues encountered in launching the Branch. Much of the success was due to the retiring honorary secretary, Mr. Williams. The new president also stressed the sterling work accomplished by Mr. Williams, who, in acknowledging, said the success was due to the fact that it had fulfilled a real need in the Union. The standard of foundry practice had been raised very materially during the war. Continued improvement would ensure the future of the industry under conditions of post-war overseas competition. Mr. Davidson, who also spoke, pleaded for the creation of a sister organisation which would cater on similar lines for the mechanical engineering industries.

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CANADIAN IRON AND STEEL OUTPUT

Production of iron and steel in Canada in the first half of 1943 failed to maintain the high rate attained in the corresponding period of 1942, reports "The Iron Age." The downward trend commenced in January of this year when the steel mills at Saulte Ste. Marie, Ont., and Sydney, N.S., were closed for two weeks on account of labour strikes. Necessary furnace repairs that have been under way at the various mills since have contributed to the reduced production.

For the first six months of this year pig-iron production totalled 867,789 net tons, which is 11 per cent. under the 974,000 tons reported for the same period last year, but is 23.8 per cent. above the 700,616 tons produced in the first half of 1941, according to the Dominion Bureau of Statistics. Production for the period under review included 704,695 tons of basic iron, of which 677,872 tons were for further use of producing companies and 26,823 tons for sale; 76,594 tons of foundry iron and 86,500 tons of malleable iron, all the latter two grades being for sale.

Steel production in the six months totalled 1,449,153 net tons, a fairly large decline from 1,559,238 tons reported for the same period a year ago, but 16.5 per cent. greater than the 1,286,246 tons produced in the first half of 1941. Production included 1,416,607 tons of steel ingots and 82,546 tons of castings. Production of ferro-alloys in the first half of this year showed little change from the corresponding six months of 1942, standing at 111,793 and 107,843 tons respectively, and compared with 98,426 tons in the first six months of 1941.

AMERICAN STEEL EXPANSION

In a Paper presented by J. A. Kinney, Bethlehem Steel Company, at the recent Annual Convention of the American Iron and Steel Institute, the author gave the following table showing the total war expansion in the American steel industry from January 1, 1940, to the end of the programme. The total increase will be 28 per cent. in the case of pig-iron and 20 per cent. in the case of steel.

	Capacity at		Total expansion.
	Jan. 1, 1940.	End of programme.	
	Net tons.	Net tons.	Net tons.
Pig-iron and ferro-alloys ..	55,724,000	71,287,000	15,563,000
Steel—O.H. ..	73,721,000	84,788,000	11,067,000
—Bessemer	6,010,000	6,553,000	543,000
—Electric..	1,888,000	6,315,000	4,427,000
Total ..	81,619,000	97,656,000	16,037,000

THE FOUNDRY INDUSTRY AND AIR WARFARE—IV

THE MASS PRODUCTION OF AERIAL BOMBS

Technical Account of Equipment and Practice at a British Foundry Casting 500-lb. Bombs with Maximum Steel Scrap and Minimum Ferro-Silicon

(*Continued from page* 100.)

Core-drying Stoves

The bogies carrying the cores are pushed through continuous drying stoves by means of an electrically-operated pusher gear, conveniently situated beneath the track at the front end of the stoves. The gear is of the screw-operated type adequately protected against the risk of sand entry. The stoves are of the gas and hot air continuous recirculating type, and operate at a maximum temperature of 210 deg. C. Each stove, which has a capacity of 3 bogie loads per hour, is divided into three zones, preheating, soaking, and cooling. The preheating zone extends over five bogie lengths, the soaking zone eight, and the cooling zone two.

For the preheating zone, waste heat from the hot castings is used, but provision has been made to assist this by coke-oven gas which is burnt in refractory-lined combustion chambers. The burners used are of the low-pressure turbulent type, in which the air and gas are premixed in the burner body before entering the combustion chambers. The hot air employed, which is drawn from the continuous cooling ovens used for the handling of newly-made castings, is supplied under pressure from a low-pressure blowing fan. The gas at the burner nozzle is at a pressure of 4-in. W.G. Additional hot air, as required, is admitted to premix with the products of combustion, prior to entering the high temperature recirculating fan. By using the waste heat from the cooling castings, a saving of at least 1,000,000 cub. ft. of gas per week is effected. Some of the concerns mass-producing iron castings might, with advantage, study the possibility of using the heat given off by newly-made castings as a post-war economy.

For the stoves under review, the products of combustion, together with the preheated air, are churned in the high-temperature recirculating fan, and are delivered to the preheating and soaking zones. This hot mixture of gases and air is then delivered under pressure to the distribution chamber extending the whole length, and formed between the arch and the roof of the stove, thence out through suitable louvred ports in the roof of the chambers it is circulated round

FIG. 20.—WRAPPING WOOD WOOL ROPE ON TO COREBARS.

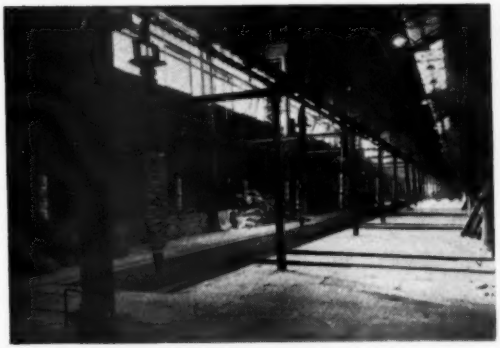

FIG. 21.—PENDULUM CONVEYOR BRINGING WRAPPED COREBARS TO COREMAKING STATIONS; ALSO CORE BOGIE.

Mass Production of Aerial Bombs

the cores through the perforated base of the bogies to the flues and the steel exit chimney.

The temperature of the combustion gases is automatically pyrometrically controlled. Hot air for recirculation is drawn by the fan from the cooling zone, and is premixed as noted above at the burner nozzle. An indicating controller is fitted, and a motor and reduction drive is arranged to operate the air and gas valves.

An electrically-operated dividing door is installed between the preheating and soaking zones, thus preventing the ingress of moisture to the soaking zone, and permitting of close temperature control. Control levers operated from the outside of the oven are disposed along the whole length of both zones. As indicating controls are fitted at regular intervals, the flow of hot gases through any section is regulatable. Vertical ducts, centrally disposed at either side of the zones, convey the waste gases to the flues, thence to a steel chimney.

An electrically-operated dividing door is located between the soaking pit and cooling zones. This ensures that both uniform temperature and correct pressure balance are maintained continuously in the soaking zone.

The system is so perfected that it is practicable to control the temperature to within plus or minus 5 deg. C. In the cooling zone cold air is admitted to the underside of the bogies. It passes around the cores, and is sucked from the top of the chamber to the inlet side of either the recirculating fan or the

FIG. 22.—CORE BOGIES BEING DISCHARGED FROM EXIT END OF CORE STOVES.

FIG. 23.—CORE BOGIES CONTAINING DRIED CORES BETWEEN EXIT END OF CORE STOVES AND CORE CONVEYOR.

FIG. 24.—CORE CONVEYOR CARRYING CORES FROM DRYING STOVES TO COREING-UP STATION.

FIG. 25.—PLACING MOULDING BOX ON TO STRIPPING PLATE MACHINE PRIOR TO RAMMING MOULD.

blowing fan. Swing doors of the hinge type are fitted at the discharge end of the oven. The bogies continue to a transfer track, and go back to the front of the core-making stations along tracks. The dried cores are lifted from the bogies on the transfer track to an overhead electrically-driven chain conveyor carrying spreader bars suspended from two chain trolleys. The spreader bars carry brackets for accommodating two bomb cores at 18-in. centres. This conveyor, which is continuously moving at the rate of 5 ft. per min., serves as an auxiliary cooling medium, and also transfers the cores to the coring-up station. When manufacturing thin-wall bombs, the cores are, by means of small tools, cut sometimes vertically in three places or spirally; the incisions thus made are lightly filled in with core sand. This brings about increased collapsibility during the period the steel is freezing around the core.

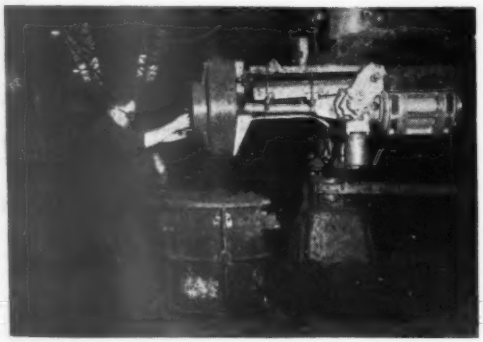

FIG. 26.—SANDSLINGING DRAG PORTION OF MOULD.

FIG. 28.—CLOSE-UP VIEW OF ONE OF THE SMALL TURNOVER MACHINES USED FOR MAKING MOULDS FOR TEST PIECES.

Moulding and Casting

For the making of the moulds a battery of Sand-slingers is used each in combination with a pair of down-draw moulding machines. The impeller heads

FIG. 27.—INSERTING CORES INTO DRAG PORTION OF MOULD.

FIG. 29.—CASTING.

Mass Production of Aerial Bombs

of the Sandslingers are 22 in. dia.; they are direct-coupled to a 20-h.p. motor, and revolve at 1,450 r.p.m. Half the stripping plate machines are used in making of drags, and half for the copes. These are of simple construction, and have been made by the concern operating this foundry. The patterns are drawn down through a stripping plate 2 ft. 9 in. by 1 ft. 9 in. to a position low enough to clear the moulds. The ram on these machines is operated by compressed air at a pressure of 80 lbs. per sq. in., through an oil cylinder, 8½ in. dia., which is fitted with dash pot and regulating valve. The control and adjustment of these machines is commendably simple.

Air hoists travelling on telpher joists are used for transferring the drag parts to the mould conveyor.

FIG. 30.—LOWERING HALF OF MOULDING BOX ON TO ONE OF THE JOLT KNOCK-OUT MACHINES.

FIG. 31.—PLACING CASTINGS, AFTER STRIPPING, ON TO BOGIES AT THE INLET END OF COOLING TUNNELS.

The cores are placed in these moulds by small double-armed jib cranes mounted on a platform. These cranes pick off pairs of cores and lower them simultaneously into the moulds. The moulds are closed by placing on

FIG. 32.—CASTINGS BEING DISCHARGED AT EXIT END OF COOLING TUNNELS.

FIG. 33.—REMOVING CORE SAND FROM BOMBS AT CORE KNOCK-OUT

the copes by means of double-armed jib cranes which transfer this part of the mould from the stripping plate machines on to the drag. The cores are centred by a jig and wedged in position by the insertion of three sections of centring rings made up as oil sand cores. The moulds are clamped, completely assembled with runner bushes and centring cakes on the mould conveyor, the operator working on an elevated platform, where supplies reach him by a conveniently disposed overhead pendulum type conveyor.

The centring rings, runner bushes, and test-piece moulds require a special plant for their production from oil sand. The centring rings are made on moulding machines of the turn-over draw-down type made by the foundry itself. The down-draw table is controlled by air pressure operating through an oil cylinder. For the runner bushes and test-piece moulds, No. 1 Ajax jolt turnover and pattern draw machines are used. The machine table is lifted pneumatically prior to turning over, and the coreboxes forming the runner bush are stripped by means of a side-drawing mechanism, which is also operated pneumatically. The sand for the machines serving this section is obtained from overhead hoppers, kept full by Rotoil mixers situated beneath hoppers receiving their supply from the main conveyor. The products of these small moulding machines are conveyed from the moulding station on a pendulum conveyor, and placed in a vertical hot-air drying stove, after which they are placed on the conveyor and passed along to the mould assembly station.

Casting is carried out from a platform erected at the side of the mould conveyor. The ladles of molten steel are received on a platform dial type weighing machine, and are conveyed to the casting station by means of 7-ton electric telphers running on an endless telpher track 192 ft. long.

FIG. 34.—CUTTING OFF INGATES WITH OXY-ACETYLENE FLAME.

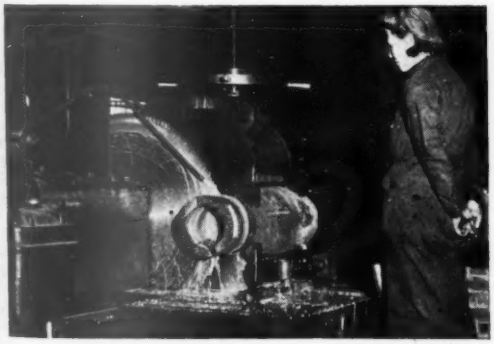

FIG. 35.—ONE OF THE COLD SAWS CUTTING OFF THE CASTING HEAD.

FIG. 36.—ONE OF THE SWING GRINDERS REMOVING THE SURPLUS METAL AT THE INGATE.

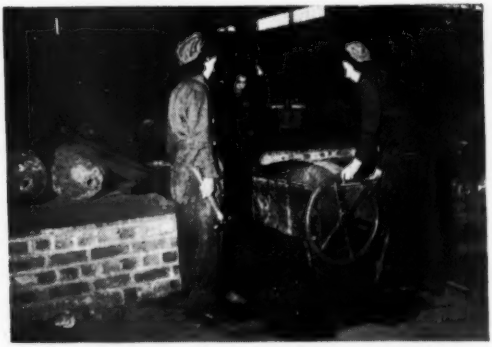

FIG. 37.—PRELIMINARY AIR PRESSURE TEST.

Mass Production of Aerial Bombs

Mould Conveyor

The mould conveyor is a complete articulated train of 58 steel chassis, each of which carries a series of cast-iron mould carrying plates in four sections, having a total length of 9 ft. 8 in. long by 4 ft. wide, designed to carry two moulds. The conveyor operates between 227-ft. longitudinal centres and 40-ft. transverse centres. When fully loaded the conveyor will carry about 380 tons. The movement of the conveyor is actuated by two 18-in. air cylinders, each cylinder having an 11-ft. stroke, and exerting a pull of 20,300 lbs. at 80 lbs. per sq. in. pressure. The conveyor is intermittent in action, and is stationary whilst the following operations are being carried out: (1) Four drags being placed on the conveyor; (2) eight cores being lowered into position; (3) four copes being set on the drags; (4) four boxes being clamped and assembled; (5) four copes being stripped and knocked out; (6) eight castings being removed from the moulds; and (7) four drags being knocked out.

FIG. 38.—PENDULUM CONVEYOR HANDLING COREBARS AND CASTING HEADS.

Heats are timed to arrive continuously at the casting platform, so that no break occurs. The casting platform is 48 ft. long, and is sufficient to allow for one heat of 16 bombs to be cast, if necessary, without any movement taking place.

The corebars are withdrawn approximately two minutes after casting by means of small overhead travelling air hoists. From here the mould conveyor takes its load into a tunnel, 40 ft. long by 9 ft. high by 4 ft. 3 in. wide, wherein the fumes and gases are extracted by an exhauster fan with a capacity of 15,000 cub. ft. per min. The fan is driven by a 10-h.p. motor at 1,440 r.p.m. On emerging, the castings are stripped and moulding boxes knocked out by means of a battery of 5-ton overhead cranes serving the knock-outs previously referred to.

For knocking-out the copes and drags, jolt grids are used, whilst for the actual casting, stationary grids are sufficient. The overhead cranes deliver the empty boxes on to a gravity roller conveyor along which they move to the back of their respective moulding stations. Here they are picked up and placed on the stripping machines by the air hoists previously referred to. The hot castings are placed on specially constructed bogies travelling on two tracks, each bogie carrying eight bombs which are propelled through two cooling chambers by means of electrically-operated screw type pusher gears.

These chambers, which are about 120 ft., accommodate about 25 bogies; air is drawn from beneath the bogies at the centre of the furnace, and is taken to a large blowing fan at the discharge end, where it is picked up by exhaust ducts situated at the side of the chambers, leading to a common main at the top of the chambers. The hot air so generated is led for use with the core stoves as described earlier.

FIG. 39.—SECTION OF CANTEEN.

Fettling

On discharge from the cooling chambers, the bogies containing the now cooled bombs are transferred crosswise to a track beside which are positioned the core knock-outs. Their load removed, they are passed forward and mechanically conveyed by a single strand continuous moving chain floor conveyor of the drag type to another transfer at the end of the track, bringing the bogies again into circulation to the knock-outs on the track by the mould conveyor.

The core sand being removed, the bombs in pairs as cast—handled by 1-ton electric overhead cranes—pass through a Wheelabrator cabinet, which removes any sand adhering around the ingates, after which they are placed on the floor for the ingates to be parted. The now-separated bombs are distributed by means of an electrically-operated transfer bogie to the various gantries along which they roll to the

(*Concluded on page* 128.)

THE INSTITUTE OF VITREOUS ENAMELLERS

ANNUAL GENERAL MEETING IN LONDON

The annual general meeting of the Institute of Vitreous Enamellers was held at the Waldorf Hotel, London, on Saturday, October 9, Mr. W. Todd (Chairman of Council) presiding. The Hon. Secretary announced the receipt of 13 apologies for absence. The minutes of the previous annual general meeting, held at the Grand Hotel, Birmingham, on September 12, 1942, were read, confirmed and signed.

The CHAIRMAN said that as the results of a suggestion to the Council by a member, he had prepared a statement, which had been circulated, in the form of a Report of the Council instead of the usual customary speech by the Chairman. This gave all the members an opportunity of studying it and of raising any points they might desire, and upon which enlightenment would be given. Incidentally, he mentioned that as regards the Whittle Foundation, the sum of 25 guineas which had been collected, consisted of two donations, and he had received notification that morning of a further donation of £20. Therefore, although the Fund had only just been opened, donations were coming in, and the Council confidently expected support from all the members.

Council Report

In the course of the Report of the Council, the Chairman pointed out that during the past year the Institute has maintained its membership, strengthened its financial position, made progress in research, and taken steps to see that it plays an important part in the rehabilitation of industry following the cessation of hostilities. The total membership was now 172, made up of 85 firms, 55 ordinary members, 19 associate members and 13 associates. The loss of certain members, many of whom were expected to return after the war, had been balanced to some extent by 6 new ones. The Treasurer's report showed a financial position which was satisfactory bearing in mind all circumstances.

The Council had met six times during the year, and the average attendance had been 12 out of a maximum of 17, a satisfactory proportion in these days of difficult travelling. The election of the new President, Mr. Whittle, was celebrated in London on December 11 by a dinner at which several distinguished guests were present. A permanent tribute to Mr. Whittle's work for the Institute had now been devised in the W. H. Whittle Foundation. This provided a prize to be awarded each year for the best essay of a practical nature submitted by a junior enamel technician. The Council had resolved to finance this by inviting voluntary donations.

During the year much thought and discussion has been devoted to methods of promoting the extended use of vitreous enamel and ensuring that it is not displaced by competitive materials. Ideas have been exchanged with other representative bodies in the industry, and although no immediate agreement could be reached on a plan of action, useful foundations were laid for post-war activity in this connection.

After a lapse of three years a new volume of Proceedings was to be published, covering the time since publication of the previous volume in 1940. It would contain much hitherto unpublished material, particularly some of the results of the Institute's research work. Research work is proceeding simultaneously on several lines, and the question of enamel compositions has begun to play an increasing part.

Relations have been maintained with official and other bodies, and the Institute has acted in an advisory capacity to the Board of Trade and the Ministry of Supply. Steps have been taken to draw attention to misleading and incorrect views on vitreous enamel expressed in the Press and elsewhere. The Institute will also participate in the drawing up of any British Standard Specifications involving vitreous enamel or enamelled products.

Following the previous work on enamelled steel as a material in the construction of anti-glare equipment, the Institute is now assisting the Corrosion Committee of the Iron and Steel Institute in long-term tests on the corrosion of buried metals. Enamelled cast-iron pipe specimens are being provided for burial in various types of soil, as a comparison with other methods of metal protection.

Authentic information on the use and possible use of vitreous enamel in building construction has been given to the Ministry of Works and Buildings, and similar advice will be given about household fitments. Inquiries about vitreous enamel and enamelled products are regularly dealt with, and a carefully considered reply given to each, however trivial it may appear.

The Report was adopted without discussion.

Treasurer's Report

The HON. TREASURER (Mr. W. S. Grainger) then presented the accounts for the past year, and at the same time expressed his appreciation of the members' continued confidence in him, in that there were no other nominations for the post of Hon. Treasurer last year. He gave details of all the items in the accounts, and pointed out that there was a surplus on the income and expenditure account of £1 5s. 1d., in addition to which the sum of £5 16s. 7d. had been brought into the account from the previous year. There had actually been a greater surplus than that, but the Council had decided to transfer £70 to the Research Account, bringing that up to £295. The Statement of Accounts was adopted without comment, and the Hon. Treasurer was cordially thanked for his work during the past year, satisfaction being expressed at the same time at the healthy state of the Institute's finances.

The CHAIRMAN, referring to the election of a President for 1943-44, said that the Council, having regard to existing circumstances, had asked Mr. W. H. Whittle to continue in office for another year. He therefore moved the re-election of Mr. Whittle. MR. V. C. FAULKNER said he had very great pleasure in

Institute of Vitreous Enamellers

seconding the motion, adding that Mr. Whittle had served the Institute extremely well and was a familiar figure at all the Council meetings. The motion was carried with hearty acclamation.

President's Review of Position

MR. WHITTLE, expressing his appreciation of this renewed confidence in him, said he would continue to do his best for the Institute as a body rather than for any particular firm or individual. Continuing, he said it was very difficult to make any sort of Presidential Address in the circumstances now existing. As everybody knew, the industry was unfortunate enough to be amongst those not to be engaged immediately on war work when hostilities broke out. A number of plants had had to be closed down completely and others were partially closed down. The remainder had gradually got on to munitions in the matter of heat treatment, etc. Nevertheless, he felt that the prospects of the industry as a whole were exceptionally good. Hitherto they had not done so much with the building industry as might have been the case, but it had been announced in the daily papers that morning that sanction had been given for the building of 150,000 houses, and when it was remembered it was contemplated building some 4 million houses over a period of years, it was certain that the industry would come in for a considerable portion of the work, especially in the matter of kitchen equipment and hollowware.

No doubt, it would take a considerable time before the industry finally settled down again and got into full swing, the main reason being that in some cases shops had had to be cleared in order to get on with other work, and they would take quite considerable rehabilitation. Unfortunately, too, some of those who had been engaged in the industry and had gone into the Forces would not return, and others who did return might not want to come back into the industry. Nevertheless, he felt they could look forward with confidence to the future, providing there were sufficient technicians in the industry. In this latter respect he felt there would be a strain put on the industry which called for serious consideration, but that was a matter for the industry as a whole, and the Institute in particular, to take in hand as soon as possible. One pleasing feature was that the Institute had been able to continue to function during the past difficult years, and the large attendance at this meeting and the group of Papers that was to be read and discussed, as well as the number of nominations to fill the three vacancies on the Council, was evidence of a real live interest in the work of the Institute. He felt the Institute was acting wisely in carrying out as much research work as possible during the present difficult period, and a number of matters were in hand which would undoubtedly prove of benefit to the trade as a whole eventually.

The CHAIRMAN said it would be remembered that when Mr. Whittle was elected President last year, this caused a vacancy on the Council. The Council subsequently exercised its prerogative and co-opted Mr. Gardom to the Council. At the same time Mr. Gardom, by virtue of being a Vice-President, was entitled to sit on the Council, but it was felt this did not carry quite the same weight as being an actual member of Council. Some people thought a vice-presidency was more an honour, and therefore the Council felt that Mr. Gardom's work on the Council was likely to be more constructive if he were directly elected to it. Mr. Gardom had done sterling work for the Institute and great benefit was derived from his opinions and advice. Therefore, the Council now asked the meeting to confirm the election of Mr. J. W. Gardom to the Council. This was unanimously agreed to.

The auditors—Messrs. Wenham Bros. & Company—were unanimously re-elected.

New Council Members

The CHAIRMAN announced that, as the result of the ballot to fill three vacancies on the Council, the following had been elected:—Mr. J. T. Gray, Mr. A. Biddulph, and Mr. W. Todd. He added that there were 12 nominations for the three vacancies. After welcoming Mr. Gray and Mr. Biddulph, he paid a tribute to the two retiring members—he himself having been re-elected—*viz.*, Mr. W. Thomas and Mr. C. J. Baines, who, he said, had been most assiduous in their attendance at Council meetings and had given most useful help. Commenting on the large number of nominations for the three vacancies, he said this evidence of the great desire to help the work of the Institute was greatly welcomed by the Council. Although some people might think the Institute had been a little somnolent, both it and the industry were very much alive. The industry was ready to burst forth as soon as they had the word "go." Some firms would be more fortunate than others in turning over. There had been difficulties in turning from peace to war, but he was inclined to think that there would be infinitely greater difficulties in some cases in turning over from war to peace. Nevertheless, he felt confidence in the ability of the industry to rise to the occasion and solve the problems which would have to be faced.

Canadian and American Visitors

MR. J. H. GRAY, JUN., mentioned the possibility of hospitality being extended to members of the Canadian and American Forces in this country who were connected with the enamelling industry. He suggested something might be done in this way which would be mutually beneficial, and said he had written to the Red Cross trying to contact a number of people.

The CHAIRMAN said that some members of the Canadian and American Forces had come over here with letters of introduction, and he had personally arranged to show them round not only his own plant, but other plants in various parts of the country. Beyond that the Council had not done anything, but they were only too pleased to consider any suggestions that might be

(*Continued on page* 128.)

METAL ON WOODEN PATTERNS AND COREBOXES

By "CHECKER"

It is the usual practice in patternmaking, when producing wood patterns and coreboxes for large numbers of castings, to make them from either pine with mahogany or hard wood facings where they will receive the greatest wear, or entirely from hardwood. Even when made from hardwood, the sharp corners of bosses, etc., soon show signs of wear, which will be reproduced on the castings unless the moulds and cores are touched up, and before long may be so bad that complaints will be received from the machine shops.

FIG. 1

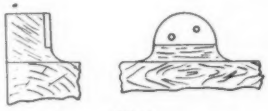

FIG. 2.

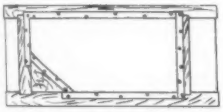

FIG. 4.

FIG. 3.

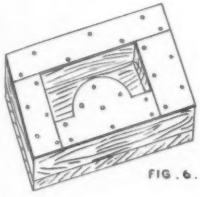

FIG. 6.

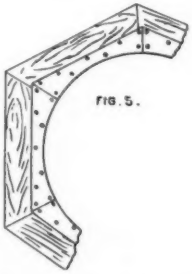

FIG. 5.

By facing with metal the parts that are most likely to get worn, the patterns and coreboxes can be used for much longer periods in the foundry before having to be returned to the patternshop for repairs and repainting. Aluminium, brass or mild steel, about $\frac{1}{16}$ to $\frac{1}{10}$ in. thick, is suitable for facing the wood, and although brass and mild steel are harder wearing, the aluminium is much easier to file and work to shape. Generally, the parts of patterns that can be metalled to advantage are square corners, bosses, and prints, but each will vary according to its own peculiarity. Fig. 1 shows the square corners of a pattern which are protected by metal; if obtainable, strip metal of $\frac{1}{2}$- to $\frac{3}{4}$-in. width would be an advantage over sheet metal, as it would save time in cutting to width. Recesses are cut in the pattern to take the strips so that they are flush with the pattern face when screwed into position with No. 4 screws. To ensure good square corners, it is advisable to leave the edges of the strips slightly projecting over the corners, removing the surplus after fixing in position. It will be noted that these corners are protected on one side by the width ($\frac{3}{4}$ in.) of the strip, while the other has only the thickness ($\frac{1}{10}$ in.), so care should be taken to place the width on the side which needs the most protection. Bosses can be tipped with metal, as shown in Fig. 2, and if metal of $\frac{1}{16}$-in. thickness is used, it will be found that No. 2 or No. 3 thickness screws will be required. Care must always be taken so that the wood is not split when encountering short grain. The metal pieces should have holes for screws drilled and countersunk, and be worked almost to shape before fixing, enough being allowed on for finishing when in position. Coreprints generally, owing to their exposed position, are liable soon to show signs of wear, and should be covered completely on the face with metal, or with segments as shown in Fig. 3, the inside edge being straight, which is easier to cut to shape and fit than a curved edge.

Corebox frames require metalling on the top, to stop continual strickling reducing the depth, strip metal being used, as shown in Fig. 4. The depth of the wooden frames is made smaller by the thickness of the metal, so that, when the metal strips are screwed on, the correct height is obtained. The edges of large-diameter coreboxes can be preserved by a ring of segments, as shown in Fig. 5, and the tops of small coreboxes should be metalled on the top, as shown in Fig. 6.

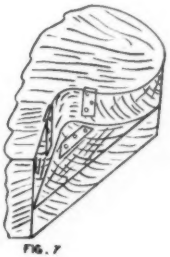

FIG. 7

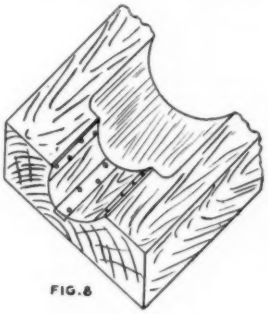

FIG. 8

The placing of chills on patterns and coreboxes may leave an impression on the wood, which will become deeper if action is not taken to avoid it; the chills become misplaced, leaving an incorrect shape on the casting. Fig. 7 shows how three pieces of metal, two for the sides and one for the bottom of the chill to press against, stops it wearing into the wood. It is not necessary for metal to be placed

(*Continued on page* 134.)

THE FOUNDRY INDUSTRY AND AIR WARFARE

(*Concluded from page* 124.)

various cutting-off machines, where the casting head is parted from the bombs. From here the bombs are transferred on gantries to a battery of swing grinders, where the external portion of the bomb, particularly the ingate, is trimmed off. The swing grinders used carry a 16-in. wheel.

They are spindle and pulley driven by texropes from a 5-h.p. motor. The grinding wheel and motor drive are mounted on a chassis, which is slung from a 1-ton hoist block. This is free to travel on an overhead runway joist. The surface speed of the wheels is of the order 9,000 ft. per min., but two alternative speeds are provided, with safety device to prevent the rated speeds being exceeded, and control is by means of push-buttons mounted on the machine. A dust-collecting hood is attached to each grinder with 6-in. metallic flexible tubing connecting to overhead trunking, which runs down the shop to an exhauster fan and dust separator of 6,000 cub. ft. per min. capacity, situated on the outside of the building.

From this point, the castings are passed along gantries to the testing machines, where each bomb is tested under water to an air pressure of 40 lbs. per sq. in. They then continue to roll along the gantries beneath a 5-ton electric overhead travelling crane, which loads them into lorries for transfer to the machine shops. Any slight surface defects are remedied by electric welding before despatch.

The mechanisation is completed by a very useful overhead chair conveyor, which has a circuit of over 850 ft. Amongst its duties, it returns the corebars from the stripping station to the wood wool wrapping machines, and collects the cut-off heads for transfer to wagons outside the buildings, the discharge of both corebars and heads being automatic.

Shop Heating and Lighting

Mercury discharge lighting is used throughout the foundry, and the gas-filled type of lamp in the melting shop. They give a general intensity of eight foot-candles, except in the moulding bay, where it is increased to twelve. Heating is effected by sixty steam-heated Dunham units, each having a fan of one-sixth h.p. at 1,425 r.p.m., complete with copper tube heater batteries in a steel casing with adjustable deflecting louvres.

The perfect synchronisation of the whole of the movements, and the high output of uniformly high quality thin-sectioned green-sand castings has placed this foundry amongst those in the forefront of the world's quantity production establishments. Moreover, it is staffed by more than 50 per cent. female labour. Equally meritorious with its engineering excellence is the rigorous metallurgical control imposed. It indicates, by the economic utilisation of the heat of the cooling castings, and the provision of a dust-free atmosphere, some of the trends which will profoundly modify the design and operation of the foundry of the future.

MELTING FURNACES FOR ALUMINIUM ALLOYS

According to Mr. R. R. LaPelle, writing in "Metal Progress," oil-fired reverberatory furnaces ranging in capacity from 5 to 15 tons are being used in American industry for melting aluminium alloys. This fuel or gas is preferred to coke on account of the reduced time necessary for melting, which enables the management to instal smaller capacity melting units. Naturally with very large units, the rabbling of the bath after the hardening additions have been made is prolonged, and may occupy between 15 and 30 minutes in order to ensure a homogeneous bath. The laboratory requires from 20 to 40 minutes to make analyses. If the composition is correct, then, assuming chlorine is used as a dehydrogeniser, pipes connected to cylinders are inserted beneath the surface of the bath. These pipes are then moved slowly throughout the length and breadth of the bath. If chloride flux is used, this is enclosed in aluminium tubes and introduced below the surface of the metal by special tools. It is recommended that fluxing by either method should be carried out at about 690 deg. C., after which the bath should be raised to between 718 and 732 deg. C. as rapidly as possible. For the preservation of the furnace walls or any cast iron parts with which molten aluminium may make contact, the author recommends the use of a coating of French chalk applied at frequent intervals preferably by means of spray gun.

THE INSTITUTE OF VITREOUS ENAMELLERS

(*Continued from page* 126.)

made. He could say, however, that the members of the Council and the membership generally were only too pleased to show hospitality to the Canadian and American Forces, and it might be possible to contact the industry in those countries and try to get into touch with members of the industry there who had come over here. With such a list it might be possible to depute members in certain areas where those members of the Forces were located to take steps in the matter.

MR. J. T. GRAY suggested it might be possible to approach these overseas members of the Forces through periodicals which circulated amongst them here. He did not think the financial question would arise, because he was sure that anybody in the industry here would be quite prepared to bear the expense of showing our Canadian and American colleagues round their works and entertaining them.

The CHAIRMAN said the Council would make contact with the industry in Canada and America and ask if there were, from time to time, members of the industry with the Forces in this country. This suggestion met with the approval of the meeting.

This closed the proceedings of the Annual General Meeting, which was followed by the Technical Session, at which four Technical Papers were presented and discussed. These Papers and reports of the discussions will appear in subsequent issues.

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THE SCRAP BAROMETER

By "Onlooker."

The scrap situation in this country has passed through many phases since the war began, some minor and some major, but it is certainly safe to say that we have now got matters much more ship-shape than they were in the early days. In the past there has been no kind of direction as to scrap usage in the U.K., and it was not until the Non-ferrous Control section of the Ministry of Supply took a hand that real progress was made, although even now it has not proved to be possible to achieve complete success. The ideal arrangement is, of course, that arisings in any particular area should be consumed locally in order to avoid transport over long distances, and certainly in this respect things are better than they were. In pre-war days price was the governing factor, and if, for example, consumers in the Glasgow area were paying exceptionally favourable prices for gunmetal, then merchants would not hesitate to move material from London, or any other distant point. Since the restrictions on the use of road transport were intensified, the question of moving secondary metal from point to point bulks larger in the picture, and the railways and canals are taking over a bigger share of this work. Containers, *e.g.*, bags, drums, casks, etc., so useful for packing the smaller and lighter varieties, are getting scarce which increases trade difficulties.

Contamination of scrap material has always been something of a bugbear and every year there is in this country a very considerable expenditure of time and money in putting to rights by sorting, magnetting, etc., parcels of scrap, brought down in value through the careless introduction of deleterious elements. This can, and does, happen in all sorts of ways, and sometimes it just cannot be helped, especially when there is a big pressure for output and labour cannot be spared from the production side to look after scrap. That at least has been the case in the past, but the time came when submarine warfare was intensified by the enemy to a point which made it absolutely necessary to reduce imports to a minimum. So far as non-ferrous metals were concerned, the obvious action to take was to increase our usage of secondary metals, especially perhaps as we were receiving virgin copper and zinc from the United States on Lend/Lease terms. To this end contamination just had to be avoided, and it was also necessary that consumers should be persuaded, and if necessary instructed, to raise the ratio of scrap used in relation to virgin metal. Results have been distinctly satisfactory, and in this spirit of necessity being the mother of invention, the non-ferrous metal trade has learned to absorb scrap in a manner which was unknown before the war. Perhaps the most important thing is, however, that the lesson thus learnt is likely to stick and that therefore scrap will figure in the post-war world as an important link in the raw material supply chain.

The position now seems to be that with activity in certain sections of the non-ferrous metal industry less than it was, and supplies of virgin metals pretty much

(*Concluded in next column.*)

NEW AMERICAN X-RAY UNIT FOR INSPECTING AIRCRAFT CASTINGS

A new mass production X-ray machine capable of inspecting as many as 17,000 aircraft castings in a 24-hr. day has been developed for a Mid-western war plant by Westinghouse engineers. This brings the advantages of assembly line speed to X-ray work and makes it possible to X-ray metal castings for defects at a rate of one every 5 secs.

The new unit's speed is given by a moving conveyor 40 ft. long and 3 ft. wide that transports the castings through the X-ray inspection and provides the fastest method yet devised to spot flaws in large quantities of metal parts. This unit produces an exposed film of six castings every 30 secs. to provide an almost continuous flow of exposed film ready for developing. When developed, each film shows an inside view of the six castings. Faulty castings with blow-holes, cracks and other defects then can be weeded out.

Designed to inspect both engine and fuselage castings up to 5 in. in thickness, the mechanism has been installed at a Detroit, Michigan, plant of a large automobile manufacturer producing war materials. Inside two steel towers, each 12 ft. high, and situated near the middle of the conveyor, the actual X-ray inspection is conducted. Each tower houses an X-ray tube—one tube operating at 140,000 volts, the other at 220,000 volts—so that castings of different types and thicknesses can be examined at the same time.

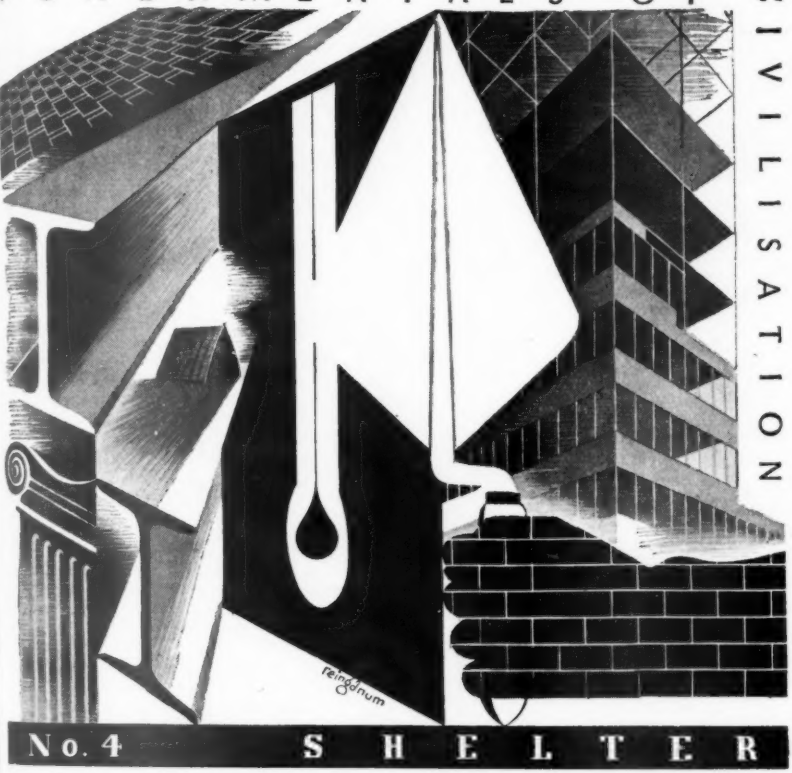
The castings move along the conveyor on trays that halt automatically under the X-ray tubes. A lead-lined protective device shields workmen from X-radiation while the exposure is made, and the castings then continue along the conveyor. For quickly identifying any defective castings, corresponding numbers are given the film and the castings. The unit can be operated by one man or eight men, depending upon the volume and speed of production desired.

Owing to the safety factor provided by the lead-lined hoods, the unit can be located anywhere in the plant and other work can continue without interruption while the X-ray exposures are being made. Previous methods required a special lead-lined room which had to be temporarily evacuated during exposures, resulting in loss of time and efficiency.

(*Concluded from previous column.*)

as they were, the call for scrap is not likely to be so insistent as it has been. In brass swarf, where the price was recently forced up unduly, there has been a collapse in values due to the sharp curtailment of demand, and this should be a warning to those who believe that the days of price fluctuation are a thing of the past. The fall of Italy foreshadows the ending of the war and the return in one guise or another of peacetime problems, among which in due course will appear day-to-day changes in value. At the moment the trend in scrap metal prices certainly seems to be downwards.

FUNDAMENTALS OF CIVILISATION



THE UNITED STEEL COMPANIES LTD

No. 4 SHELTER

To possess a habitation is the common instinct of every living creature. Nature displays many marvels of ingenuity and constructive skill only surpassed by man. But the spider still spins its web as it did millions of years ago. Aeons of change and development in living organisms have added nothing to the materials of construction used by the birds, beasts, fishes and insects.

The highest product of evolution is man, who acquired reasoning powers which first enabled him to abandon the clammy caves for the warmth and comparative security of a wood and wattle hut. From these dim beginnings he learnt to make bricks from clay; to hew and carve the stone for temple and cottage. Yet, though he acquired skill to fashion rich architectural gems with greater spans of roof in wood and stone, his shelter was still earthbound.

With the advent of steel his imagination began to soar till now it has become essential to his needs in erecting structures of towering height. The progressive genius of man will find even greater scope in utilising the many forms of steel in the light, airy and spacious edifices for the cities of the future.

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THOS. BUTLIN & CO., WELLINGBOROUGH

U.S.P. 29

NEWS IN BRIEF

BRITISH LIGHT METAL COMPANY, LIMITED, is being wound up voluntarily. Mr. Hubert Branson Smith, chartered accountant, has been appointed liquidator.

COKE & GAS OVENS, LIMITED, is being wound up voluntarily. Mr. H. F. Kimbell, 3, Buckingham House, Monk's Drive, London, W.3, is the liquidator.

THE KELSEY-HAYES WHEEL COMPANY, LIMITED, has given notice of redemption of the whole outstanding 5 per cent. first mortgage debenture stock, amounting to £75,000.

RICHARDSONS, WESTGARTH & COMPANY, LIMITED, marine and general engineers, propose to redeem on December 31 next at £105 the whole of the 5½ per cent. first mortgage debenture stock then outstanding.

THE LARNE (CO. ANTRIM) FOUNDRY of W. H. Kane & Company, consisting of the foundry in Circular Road, the Rock Works and the Inver Engine Works at Ballyloran, has been taken over by Mr. Leonard Lewis, of London.

THE SHEFFIELD SOCIETY OF ENGINEERS AND METALLURGISTS will hold a meeting in the Royal Victoria Station Hotel, Sheffield, at 2.30 p.m., on Saturday, October 16. The president, Dr. W. H. Hatfield, will speak on "My Recent Metallurgical Experiences."

DUNDEE WOMEN ENGINEERS have failed in a claim before the National Arbitration Tribunal for advances in wages. The parties to the dispute were Urquhart Lindsay & Robertson Orchar, Limited, Blackness Foundry, Dundee, and female members of the National Union of General and Municipal Workers.

SPEAKING AT WOLVERHAMPTON Mr. Gordon England, president of the Engineering Industries Association, said that 97 per cent. of the 41,349 factories in the country before the war employed less than 250 persons, and only 0.4 per cent. employed 1,000 persons or over. Before the war 65 per cent. of our export trade consisted of engineering products.

A GOOD TIME-KEEPING CAMPAIGN was inaugurated by Sir Patrick Dollan last week at a West of Scotland factory and engineering works employing more than 6,000 men and women. The production committee, which is responsible for the enterprise, proposes to give time-keeping bonuses for two weeks to the comforts fund of the 51st (Highland) Division. Sir Patrick stated that absenteeism in the works averaged about 8 per cent., and could be brought down to 3 per cent., which was in keeping with the best establishments in Great Britain.

A NUMBER OF CHINESE engineering graduates, who are to receive practical training in British workshops, were welcomed at the F.B.I. headquarters in London last Friday. They are the first of a contingent of about 60 men specially selected by a committee in Chungking appointed by the Chinese Ministry of Education and the British Embassy. This training scheme was initiated ten years ago by the Federation of British Industries, since when 58 Chinese students have been trained under its auspices with highly successful results. When war broke out, the plan was interrupted, but it is now being continued on a larger scale.

PERSONAL

MR. W. SHORROCKS retired on September 30 after 55 years' service with Dobson & Barlow, Limited, Bolton, textile machinists and ironfounders. For the past ten years he has been managing director.

MAJOR H. R. KILNER has been elected president of the Society of British Aircraft Constructors in succession to Mr. A. F. Sidgreaves. Major Kilner is director-in-charge of the aircraft section of Vickers-Armstrongs, Limited.

MR. ESSINGTON LEWIS, who has become a Companion of Honour, is one of the leading industrialists in Australia. For many years he has been prominently associated with the Broken Hill Proprietary Company, and he is also one of the pioneers of the Australian aircraft industry.

MR. L. A. MUNRO is returning to Imperial Chemical Industries, Limited. He has resigned as Director of Investigation and Statistics of the War Office to enable the organisation to be handed over to the Director of Establishments of the War Office, when the appointment of Director of Investigation and Statistics, which Mr. Munro has held since 1942, will lapse.

MR. A. G. STEWART has been appointed a deputy-chairman of Stewarts and Lloyds, Limited, in addition to Sir Nigel Campbell. Mr. Stewart, who is 42 years of age, has been with the company since 1924 and an executive director since 1931. On behalf of the company he has visited Australia and various parts of South America, and since 1941 has occupied the position of assistant general managing director in charge of tube production. He is the only son of the late Mr. J. G. Stewart, who was chairman of the company from 1903 until his death in 1925.

MR. GEORGE RUSTON SHARPLEY, chairman and managing director of Ruston & Hornsby, Limited, Lincoln, retires from the latter position at the end of the year. He will continue to be the chairman. Mr. Victor W. Bone, a member of the board, will relinquish the position he has held since its formation in 1930 of managing director of Ruston-Bucyrus, Limited, an associate company, and will be Mr. Sharpley's successor as from January. The board of Ruston-Bucyrus, Limited, has appointed Mr. Ernest S. Everitt, at present the assistant managing director, to succeed Mr. Bone as the managing director.

Wills

HARRIS, F., of Truro, metal merchant	£57,084
MUNN, JAMES, of Dumbarton, retired shipbuilder...	£24,856
STROHMENGER, A. P., a director of Turner & Newall, Limited, and other companies	£294,095
MOSSES, WILLIAM, of Blackheath, formerly secretary to the United Pattern Makers' Association and to the Engineering and Shipbuilding Federation of Trade Unions	£10,011

Kay & Company (Engineers)—Net profit for the year to May 31, 1943, £18,816 (£17,266); dividend of 12½% (same); to general and plant reserve, £9,000; to employees' fund, £1,000 (£500); forward, £5,806 (£3,865).

NO. 10 PREPARED BLACKING

● The Latest Core and Mould Wash for IRON CASTINGS

●

STEELMOL

for STEEL and SPECIAL IRON CASTINGS

HIGH CARBON BLACKING
CEYLON PLUMBAGO
TERRA FLAKE · COAL DUST · GANISTER AND
ALL FOUNDRY SUPPLIES

JAMES DURRANS & SONS LTD

PHŒNIX WORKS & PLUMPTON MILLS, PENISTONE, near SHEFFIELD

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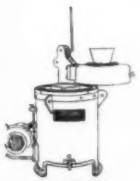
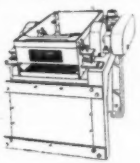
COMPACT, SELF-CONTAINED

SAVES TWO THIRDS OF FLOOR SPACE

Exceptionally Quick Mixing Times—



CRUCIBLE FURNACE



VIBRATORY SCREEN

Other "POLFORD" Products

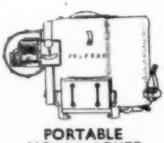
Note the small area occupied by the base of the "Polford" Core Sand Mixer. It is self-contained, the motor being built into the machine. With liquid Core Compounds, a batch may be mixed in 1½–2 minutes, and this unit will mix all Core Compounds, including semi-solids. Simple in design, fitted with screen for riddling sand as it is fed. Operates efficiently with minimum of friction. Low upkeep.

This Machine has proved excellent for mixing facing sands.

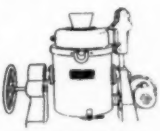
"POLFORD"

Core Sand Mixer

Patent Applied For



PORTABLE MOULD DRYER



TILTING FURNACE

THE HEATON FOUNDRY CO. LTD.

Makers of Foundry Equipment,

HEATON JUNCTION, NEWCASTLE UPON TYNE, 6.

COMPANY RESULTS

(Figures for previous year in brackets)

Herbert Morris—Final dividend on the ordinary shares of 15%, free of tax (same), making 20% (same).

Hoffmann Manufacturing Company—Interim dividend of 7½%, tax free, on the ordinary shares (same).

Brown, Bayley's Steel Works—Dividend on the 5% tax-free cumulative preference shares for the six months to July 31.

Murex—Final dividend on the ordinary stock of 10% (same) and a cash bonus of 2½% (same), making 20% (same).

Paterson Engineering—Net profit, after tax, for year to April 30, £10,785 (£10,351); ordinary dividend of 10%, plus 2½% bonus (same).

Mellor Bromley—Profit for the year to February 28, after tax, £13,416; preference dividend, £3,575; ordinary dividend of 10%; forward, £37,686 (£33,345).

Renold & Coventry Chain—Net profit for the year to June 27, 1943, after taxation, £97,461 (£100,739); final ordinary dividend of 7%, making 10% (same).

Modern Machine Tools—Trading profit for 1942, £42,405; N.D.C. and income-tax, £25,293; net profit, £17,113 (£18,299); dividend of 17½%, £10,500; forward, £65,046.

Richard Johnson, Clapham & Morris—Net trading profit for the year ended June 30, 1943, after providing for depreciation, £32,253 (£31,091); dividend on the non-cumulative participating preference shares, £1,930; ordinary dividend of 15% (same); participating dividend of 1% (same); to general reserve, £5,000; forward, £6,088 (£6,692).

Neepsend Steel & Tool Corporation—Net revenue for the year to March 31, 1943, £108,217 (£135,594); final ordinary dividend of 9d. per 5s. unit, making 1s. 6d., with a bonus of 1s., making the distribution for the year 50% (same); additional dividend on the preference shares of 4% (same); transfer to reserve for E.P.T., £15,000 (£35,000); to reserve for contingencies, £5,000 (£10,000); to general reserve, £10,000 (same); forward, £13,742 (£13,545).

IRON AND STEEL INSTITUTE

The autumn general meeting of the Iron and Steel Institute takes place in London to-day (Thursday).

During the morning, a Paper, "The Structure and Segregation of Two Ingots of Ingot Iron, one containing Lead," by L. Northcott and D. McLean, will be presented and discussed, together with two Alloy Steels Research Committee Papers, "A Study of Austenitic Grain Growth in Medium-Carbon Steels," by J. H. Whiteley, and "Leaded Manganese-Molybdenum Steel," by T. Swinden.

The afternoon session will be given over to a discussion of the following papers:—"The Solidification and Cooling of Steel Ingots. Notes on an Examination of Three Typical Ingots," by E. F. Law and V. Harbord (Paper No. 21/1943 of the Committee on the Heterogeneity of Steel Ingots), and "The Physical Chemistry of Open-Hearth Slags," by J. White.

OBITUARY

MR. GEORGE CHALMERS PRENTICE, of George Prentice & Company, metal merchants, Glasgow, died on September 30.

MR. MAXWELL BURNELL, general manager of the Ayrton rolling mills, the Bowesfield sheet works, and the Middlesborough wire mills of Dorman, Long & Company, Limited, died at Middlesbrough last week in his 65th year.

NEWS HAS BEEN RECEIVED by his sister of the death of Mr. John S. Ferguson, Chief Instructor, Junior Technical School, Hong-Kong, while a prisoner of war. He was a member of the Hong-Kong Volunteer Defence Corps. Mr. Ferguson was a member of the Scottish branch of the Institute of British Foundrymen.

SIR ROBERT S. HILTON, a director and formerly managing director of the United Steel Companies, Limited, died on Sunday, October 10, at Shipston-on-Stour, aged 72. He was a well-known figure in the iron and steel industries. Other companies of which he was a director included John Summers & Sons, Limited, and William Cooke & Company, Limited.

MR. SAMUEL JAMES HEWITT, of Ecclesall, Sheffield, has died suddenly at St. Annes-on-Sea, aged 66. He joined the staff of Edgar Allen & Company, Limited, in 1898, as chief of the laboratory. Mr. Hewitt was a past president of the Sheffield Society of Metallurgists, and a member of many technical and research committees. During 1929 he visited South Africa on behalf of Edgar Allen & Company.

SIR JAMES FORTESCUE-FLANNERY, BT., died on October 5 at Braintree, Essex, at the age of 91. Born at Liverpool, he was apprenticed at the Britannia Works, Birkenhead. Later he became chief engineer under Sir Edward Reed, who was chief constructor to the Royal Navy; then set up in practice as a consulting engineer and naval architect and founded the firm of Flannery Baggallay & Johnson. He was a past-president of the Institute of Marine Engineers, and chairman of Callender's Cable & Construction Company, Limited.

METAL ON WOODEN PATTERNS AND COREBOXES

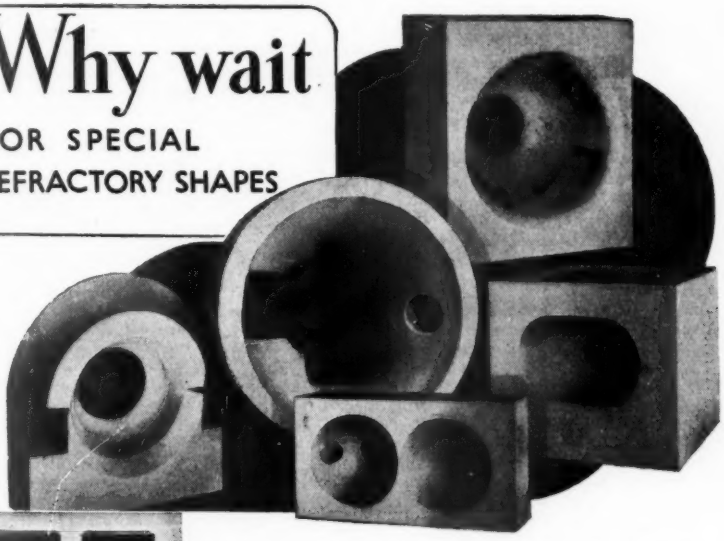
(Continued from page 127.)

the complete distance covered by the chill, as strips of metal will answer the purpose quite efficiently if positioned so that the ends of the chills will rest on them. Fig. 8 shows three pieces of metal let in a corebox to stop the two chills forming the half-circle wearing the wood away.

These are only a few of the many instances where metal can be used to advantage with wooden patterns and coreboxes. It is advisable to use screws in preference to nails for fastening the metal in position, and, if obtainable, thick shellac varnish should be used to make the wood and metal adhere together.

Why wait

FOR SPECIAL REFRACTORY SHAPES



NO SHRINKAGE. Illustration (1) shows two blocks cast in moulds and dried at atmospherictemperature. One was fired to 1500° C for four hours. Specimens are the same size.

STRENGTH. Illustration (2) shows two test pieces cast in moulds, dried at atmospheric temperature and one heated to 1000° C. Tensile strength —*Unfired*, 550 lbs. per sq. in. *Fired*, 1312 lbs. per sq. in.

FIREBRICKS . BASIC BRICKS
ACID - PROOF MATERIALS
CEMENTS . PLASTICS
INSULATION. SILICA BRICKS
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Make them quickly and economically

with DURAX No. 2

REFRACTORY CONCRETE

IN CASES of emergency, special shapes and replacements may be made quickly with Durax No. 2 Refractory Concrete. Mixed similarly to ordinary building concrete, Durax is poured into position, dries quickly and sets to a remarkable degree of hardness. There is no permanent volume change and tests have shown no signs of fusion below 1580° C—there is no tendency to crack or spall. Durax No. 2 is used for protection of header tubes and drums in water tube boilers, access door and lid linings, flame baffles, burner blocks, furnace and coke oven door linings, complete monolithic linings, small monolithic arches and all types of special shapes.

General Refractories
LIMITED

GENEFAX HOUSE SHEFFIELD, 10, ENGLAND.
TELEGRAMS: "GENEFAX. SHEFFIELD"

33

Raw Material Markets

IRON AND STEEL

The ready response made by the British steel industry to all the changing and expanding needs of war has inspired a feeling of confidence that the extension and intensification of the military effort will not be retarded by any lack of steel. Production of carbon steel is maintained at a high level, and impressive increases have been achieved in the output of those high-grade steels which are specially needed for the aircraft industry.

Recent shipments of Mediterranean ores, though they do not measure up to the most sanguine estimates, have provided a welcome contribution to the supplies of the blast furnaces, enabling the latter in turn to supplement the tonnages of low-phosphorus iron placed at the disposal of the engineering foundries. There has never been, nor is there now, any scarcity of high-phosphorus iron, and refined iron also is more readily obtainable than was the case a few weeks ago. An increase in the supply of hematite, however, though much desired by foundrymen and steelmakers, is a development which has still to be achieved.

The light-castings trade is not fully employed, and in consequence there has been some shrinkage in the demand for common foundry iron. Steelworks are able to command ample supplies of basic iron. Coke makers have substantial stocks for which they would be glad to find an outlet.

All the re-rolling plants are exceptionally busy, and orders in hand ensure the continuance for an indefinite period of this activity. Fortunately, there is no reason to apprehend any lack of re-rolling material, notwithstanding the steady shrinkage of the imports of steel semis. In peacetime large tonnages of Continental billets were imported. In the earlier stages of the war the wide gap between home production and consumption was bridged by American supplies, but since the United States has become the chief arsenal of democracy, British steelmakers have been saddled with the responsibility of providing the steel for the re-rolling mills. To this task they have applied their resources with such success that there is no shortage, and only in rare instances is it necessary to encroach upon stocks of imported semis which are held in reserve.

The output of steel plates and heavy sheets has been stepped up to record heights, and regularity of deliveries to the shipyards enables a steady rhythm to be maintained at these establishments. There are, however, many other industries of vital importance whose need for steel plates cannot be neglected. Marine engineers, boiler makers and locomotive builders have all to be considered, and bookings extend for many months ahead. Pressure for light structural sections is only little less intense, but interest in the heavier sizes is on the wane. Sheet makers have very heavy commitments, and there is no perceptible slackening in the demand for railway and colliery equipment.

The demand for steelworks' scrap remains at a high level. Heavy scrap finds ready buyers, and compressed and bundled scrap moves away well. There is a reasonably good market for heavy steel turnings, but light turnings, especially the bushy kind, are still somewhat difficult to sell. Foundry scrap is taken up fairly well on the whole, though some of the heavy grades of cast iron are not so easily placed as they were. Short steel scrap, suitable for foundry purposes and refined pig-iron making, has a ready sale.

NON-FERROUS METALS

The copper situation seems definitely to have improved. Allied successes against the U-boats undoubtedly have a lot to do with the improvement, for not only has the number of lost cargoes been reduced, but the shipping position generally has been made easier. An increased usage of brass scrap in this country also has helped to relieve the situation, in zinc as well as copper. Little is heard now of any shortage of zinc, though at one time the supply position was anything but happy. The use of zinc for galvanising purposes is still sharply restricted, but there appears to be no difficulty in filling essential needs. The same position applies in regard to lead, which is probably in more ample supply than any other of the non-ferrous metals. Tin is in a different category, but here also essential war requirements are being fulfilled, and it is believed that the United Nations still hold substantial stocks of this metal, despite the period which has elapsed since Far Eastern supplies were cut off. Some of the light metals might with advantage be more plentiful than they are, but the war industries are not suffering anything in the nature of a shortage. Production of aluminium has been stepped up very considerably during the war years, but consumption also has greatly increased, and while there is no real scarcity, every ton which becomes available must go to the aircraft manufacturers and other essential users.

CONTRACT OPEN

The date given is the latest on which tenders will be accepted. The address is that from which tender forms may be obtained.

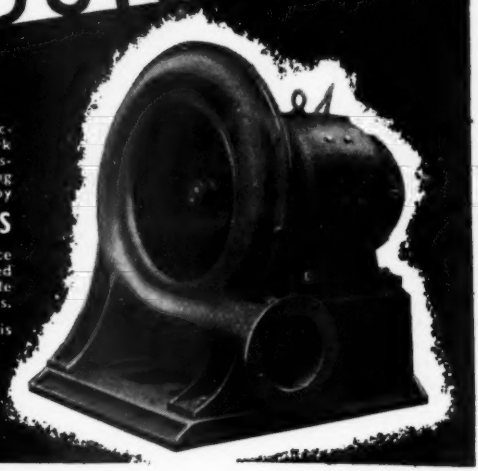
Matlock, October 25—Supply and laying about 350 yds. of spun-iron pipes and appurtenant works, for the Urban District Council. W. H. Radford & Son, Albion Chambers, King Street, Nottingham. (Fee £2 2s., returnable.)

DERBYSHIRE FLUORSPAR PRODUCERS

As the result of a preliminary meeting it has been decided to form the Derbyshire Fluorspar Producers' Association. A further meeting for this purpose will he held at the Rutland Arms Hotel, Bakewell, on October 25, at 2.15 p.m. Mr. F. Franks (director, Ernest Hinchliffe, Limited, 36, Furnival Street, Sheffield) is acting as convenor of the meeting.

TRADE SIROCCO MARK

FANS for FOUNDRIES



THE comparatively high pressures which are necessary in connection with the supply of air blast to forges and cupolas, or work of a similar character, requires the employment of a Fan possessing an exceptionally high standard of performance and operating efficiency. Such strenuous demands are adequately fulfilled by

"SIROCCO" HIGH-PRESSURE FANS

which are soundly constructed to give hard and continuous service with a minimum of attention. "Sirocco" Fans are manufactured in four different types, i.e., Cast-Iron High-Pressure, Single Inlet Cupola, Double Inlet Cupola, and Narrow-Pressure Fans.

Publication Ref. No. SF26, describing "Sirocco" H.P. Fans, is available on request.

DAVIDSON & CO LIMITED

SIROCCO ENGINEERING WORKS · BELFAST · N. Ireland

LONDON · MANCHESTER · LEEDS · GLASGOW
BIRMINGHAM · NEWCASTLE · CARDIFF · DUBLIN

There's no Casting away money when you use

STERNOCORE

Whether Oil, Cream, or Compound, the high efficiency gives better permeability, quicker drying, accurate cores, low objectionable gas content, and therefore, faster and cheaper production.

HIGHER PERMEABILITY

QUICKER DRYING

LOW GAS EVOLUTION

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REDUCED OBJECTIONABLE FUMES

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All Enquiries should be addressed to: Industrial Specialities, Dept. 34.

Also at BRADFORD AND GLASGOW

Temporary Telephone: Kelvin 3871-2-3-4-5
Telegrams: "Sternoline, Phone London"

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, October 13, 1943

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

Hematite.—No. 1 (S & P 0.03 to 0.05 per cent.): Scotland, N.-E. Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 124s. 9d.; No. 1 foundry, 127s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 174s.; South Zone, 176s. 6d.

Refined Malleable.—North Zone, 184s.; South Zone, 186s. 6d.

Cold Blast.—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

Ferro-silicon (5-ton) lots.—25 per cent., £21 5s.; 45/50 per cent., £27 10s.; 75/80 per cent., £43.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 6s. per b. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 9s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 9s. 9½d. lb.

Ferro-chrome.—4/6 per cent. C, £59; max. 2 per cent. C, 1s. 6d. lb.; max. 1 per cent. C, 1s. 6½d. lb.; max. 0.5 per cent. C, 1s. 6½d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 5d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s. 6d.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5¼ in., £16 18s.; rounds, under 3 in. to ⅜ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8g. plain, £26 17s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d., f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

NON-FERROUS METALS

Copper.—Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 10s.

Tin.—99 to under 99.75 per cent., £275; 99.75 to under 99.9 per cent., £276 10s.; min. 99.9 per cent., £278 10s.

Spelter.—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £35 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

Other Metals.—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16d.; rods, drawn, 11½d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10½d.; wire, 10½d.; rolled metal, 10½d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15½d. per lb.; brazed tubes, 15½d.; wire, 10d.

Phosphor Bronze.—Strip, 13½d. per lb.; sheets to 10 w.g., 14½d.; wire, 16d.; rods, 16d.; tubes, 21½d.; castings, 19d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4½d. to 1s. 10½d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9½d. Wire round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

NON-FERROUS SCRAP

Controlled Maximum Prices.—Bright untinned copper wire, in crucible form or in hanks, £57 10s.; No. 1 copper wire, £57; No. 2 copper wire, £55 10s.; copper firebox plates, cut up, £57 10s.; clean untinned copper, cut up, £56 10s.; braziery copper, £53 10s.; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49; clean fired 303 S.A. cartridge cases, £47; 70/30 turnings, clean and baled, £43; brass swarf, clean, free from iron and commercially dry, £34 10s.; new brass rod ends, 60/40 quality, £38 10s.; hot stampings and fuse metal, 60/40 quality, £38 10s.; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 9½ per cent. tin, £74 10s., all per ton, ex works.

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended Oct. 9, where buyer and seller have not mutually agreed a price; net, per ton, ex-sellers' works, suitably packed):—

Brass.—S.A.A. webbing, £48 10s.; S.A.A. defective cups and cases, £47 10s.; S.A.A. cut-offs and trimmings, £42 10s.; S.A.A. turnings (loose), £37; S.A.A. turnings (baled), £42 10s.; S.A.A. turnings (masticated), £42; Q.F. webbing, £49; defective Q.F. cups and cases, £49; Q.F. cut-offs, £47 10s.; Q.F. turnings, £38; other 70/30 process and manufacturing scrap, £46 10s.; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s.; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s.; 85/15 gilding metal webbing, £52 10s.; 85/15 gilding defective cups and envelopes before filling, £50 10s.; cap metal webbing, £54 10s.; 90/10 gilding webbing, £53 10s.; 90/10 gilding defective cups and envelopes before filling, £51 10s.

Cupro Nickel.—80/20 cupro-nickel webbing, £75 10s., 80/20 defective cups and envelopes before filling, £70 10s.

Nickel Silver.—Process and manufacturing scrap: 10 per cent. nickel, £50; 15 per cent. nickel, £56; 18 per cent. nickel, £60; 20 per cent. nickel, £63.

Copper.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s.; copper turnings, £48.

IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus* 3¾ *per cent. dealers' remuneration. 50 tons and upwards over three months, 2s. 6d. extra.*)

South Wales.—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d.; heavy machinery cast iron, 87s.; ordinary heavy cast iron, 82s.; cast-iron railway chairs, 87s.; medium cast iron, 78s. 3d.; light cast iron, 73s. 6d.

Middlesbrough.—Short heavy steel, 79s. 9d. to 82s. 3d.; heavy machinery cast iron, 91s. 9d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 89s. 3d.; medium cast iron, 79s. 6d.; light cast iron, 74s. 6d.

Birmingham District.—Short heavy steel, 74s. 9d. to 77s. 3d.; heavy machinery cast iron, 92s. 3d.; ordinary heavy cast iron, 87s. 6d.; cast-iron railway chairs, 87s. 6d.; medium cast iron, 80s. 3d.; light cast iron, 75s. 3d.

Scotland.—Short heavy steel, 79s. 6d. to 82s.; heavy machinery cast iron, 94s. 3d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 94s. 3d.; medium cast iron, 77s. 3d.; light cast iron, 72s. 3d.

(Note.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less 3s. per ton, but plus actual cost of transport or 6s. per ton, whichever is the less.*

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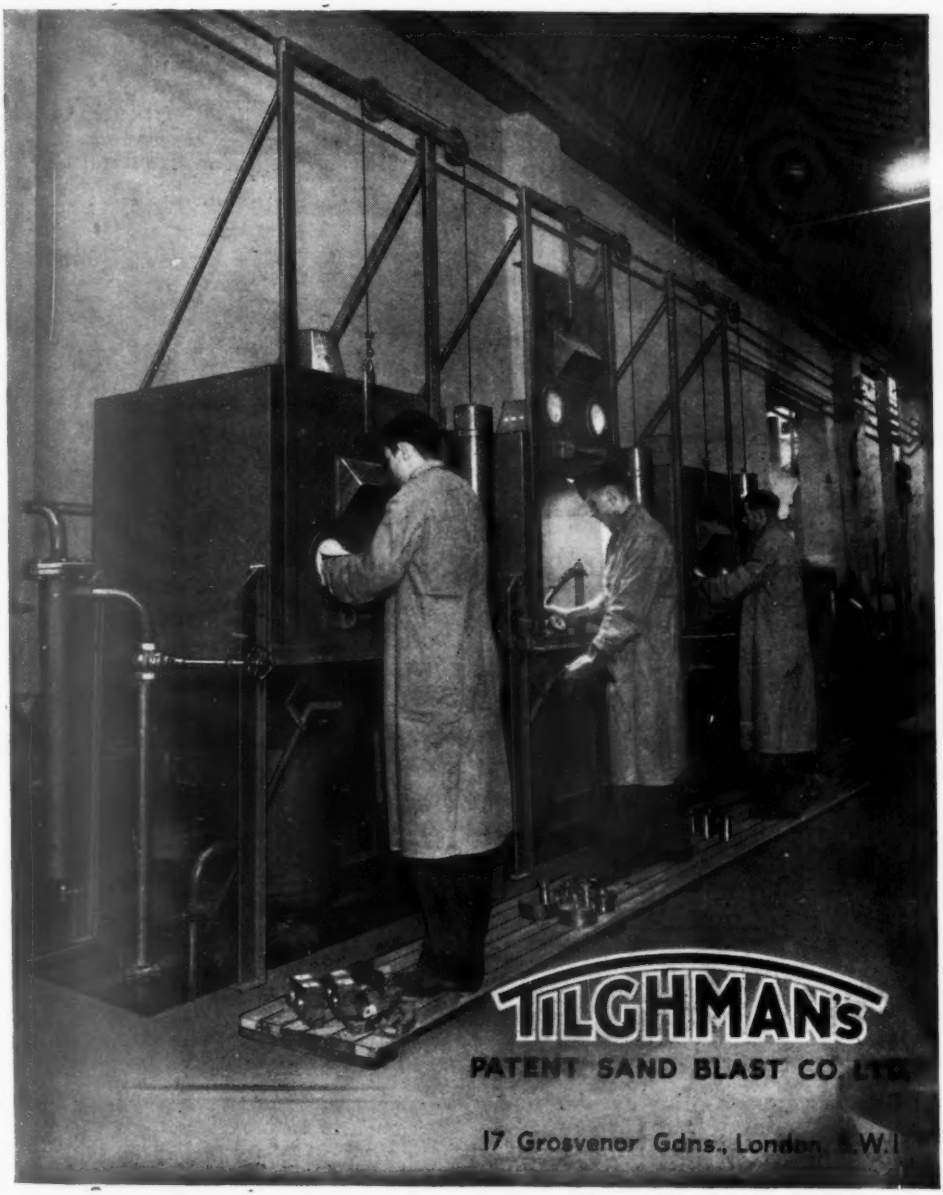
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FOUNDRY TRADE JOURNAL

EST. 1902

VOL. 71. No. 1417.
Registered at the G.P.O. as a Newspaper.

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL
OCTOBER 14, 1943
Offices: 49, Wellington Street, Strand, London, W.C.2

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